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(54) [Title of the Invention]

    PRINT CONTROL METHOD AND APPARATUS

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(57) [Abstract]

[Problem to be solved]

    To reduce the frequency of changing printer
settings of a user and simplify complicated operations
15 by transmitting to a printer all pages adaptive to
printer setting prior to a disadaptive page.
[Means for solving problem]

    The present invention comprises an image data
storing step (S1801) of temporarily storing image data
20 including a plurality of pages to be transmitted to a
printer; a page information extracting step (S1802) of
extracting printer setting information appropriate for
printing for each page of image data; a status
information acquiring step (S1804) of acquiring printer
25 status information indicating a printer setting state;
an adaptability determining step (S1805) of determining
the adaptability of printer status information to

printer setting information about each page; and an image data transmission control step (S1809) of transmitting to a printer all pages determined as adaptive prior to a page determined as disadaptive.

[Claims for the Patent]

[Claim 1]

A print control method for print control of a printer connected through a two-way communication interface, characterized by comprising:

a status information acquiring step of periodically acquiring printer status information indicating a printer setting state from the printer;

a print data converting step of converting document data into print data as a set of printer commands based on various setting contents input by a user;

a page information recording step of recording for each job on a storage device the setting contents input by the user for each page when the print data is generated in said print data converting step;

a setting information comparing step of comparing the printer status information acquired in said status information acquiring step with the setting contents of each page of the job recorded in said page information recording step each time the printer status information is updated or a new job is added, and determining whether or not each job can be printed on the printer;

a job transmission control step of temporarily holding transmission to the printer of a job determined as unprintable in said setting information comparing step, but not holding transmission to the printer of a

job determined as printable in said setting information

comparing step; and

a comparison result display step of displaying a

matching status between the printer status information

5   about the printer and the setting contents of each page

of the job.

[Claim 2]

The print control method according to claim 1,

characterized in that said status information acquiring

10   step acquires, over a network, status information about

a printer connected over the network.

[Claim 3]

The print control method according to claim 1,

characterized in that said status information acquiring

15   step acquires status information about another printer

connected to another print control apparatus over a

network from the another print control apparatus over

the network.

[Claim 4]

20   The print control method according to claim 1, 2,

or 3, characterized in that the setting contents of

each page refer to one of a type of print head, paper

information, and a lever position.

[Claim 5]

25   A print control apparatus connected to a printer

over a two-way communication interface, characterized

by comprising:

status information acquisition means for periodically acquiring printer status information indicating a printer setting state from the printer;

print data conversion means for converting document data into print data as a set of printer commands based on various setting contents input by a user;

page information record means for recording for each job on a storage device the setting contents input by the user for each page when the print data is generated by said print data conversion means;

setting information comparison means for comparing the printer status information acquired by said status information acquisition means with the setting contents of each page of the job recorded by said page information recording means each time the printer status information is updated or a new job is added, and determining whether or not each job can be printed on the printer;

job transmission control means for temporarily holding transmission to the printer of a job determined as unprintable by said setting information comparison means, but not holding transmission to the printer of a job determined as printable by said setting information comparison means; and

comparison result display means for displaying a matching status between the printer status information

about the printer and the setting contents of each page
of the job.

[Claim 6]

The print control apparatus according to claim 5,
characterized in that said status information
acquisition means acquires, over a network, status
information about a printer connected over the network.

[Claim 7]

The print control apparatus according to claim 5,
characterized in that said status information
acquisition means acquires status information about
another printer connected to another print control
apparatus over a network from the another print control
apparatus over the network.

[Claim 8]

The print control apparatus according to claim 5,
6, or 7, characterized in that the setting contents of
each page refer to one of a type of print head, paper
information, and a lever position.

[Claim 9]

A print control method for print control of a
printer connected through a two-way communication
interface, characterized by comprising:

a status information acquiring step of acquiring
printer status information indicating the setting state
of the printer;

an intermediate data converting step of converting

document data into intermediate data as a set of
intermediate commands and storing the intermediate data
on a storage device;

an intermediate data selecting step of selecting
intermediate data to be converted into print data as a
set of printer commands from among a plurality of
pieces of intermediate data stored on the storage
device in said intermediate data converting step based
on the printer status information acquired in said
status information acquiring step; and

a print data transmitting step of converting the
intermediate data selected in said intermediate data
selecting step into print data, and transmitting the
print data to a specified printer.

[Claim 10]

The print control method according to claim 9,
characterized in that said status information acquiring
step acquires, over a network, status information about
a printer connected over the network.

[Claim 11]

The print control method according to claim 9,
characterized in that said status information acquiring
step acquires status information about another printer
connected to another print control apparatus over a
network from the another print control apparatus over
the network.

[Claim 12]

The print control method according to claim 9, 10, or 11, characterized in that said intermediate data selecting step selects on a priority basis intermediate data for a printer which can normally perform

5   communications and is not in an error state, an alarm state, or a printing state.

[Claim 13]

A print control apparatus connected to a printer over a two-way communication interface, characterized

10 by comprising:

status information acquisition means for acquiring printer status information indicating the setting state of the printer;

intermediate data conversion means for converting

15 document data into intermediate data as a set of intermediate commands and storing the intermediate data on a storage device;

intermediate data selection means for selecting intermediate data to be converted into print data as a

20 set of printer commands from among a plurality of pieces of intermediate data stored on the storage device by said intermediate data conversion means based on the printer status information acquired by said status information acquisition means; and

25 print data transmission means for converting the intermediate data selected by said intermediate data selection means into print data, and transmitting the

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print data to a specified printer.

[Claim 14]

The print control apparatus according to claim 13, characterized in that said status information acquisition means acquires, over a network, status information about a printer connected over the network.

[Claim 15]

The print control apparatus according to claim 13, characterized in that said status information acquisition means acquires status information about another printer connected to another print control apparatus over a network from the another print control apparatus over the network.

[Claim 16]

The print control apparatus according to claim 13, 14, or 15, characterized in that said intermediate data selection means selects on a priority basis intermediate data for a printer which can normally perform communications and is not in an error state, an alarm state, or a printing state.

[Claim 17]

A print control method for print control of a printer connected through a two-way communication interface, characterized by comprising:

an image data storing step of temporarily storing image data including a plurality of pages to be transmitted to the printer;

a page information extracting step of extracting setting information about a printer appropriate for printing for each page of image data;

a status information acquiring step of acquiring printer status information indicating a printer setting state;

an adaptability determining step of determining adaptability of the printer status information acquired from the printer to setting information about the printer on each page extracted in said page information extracting step; and

an image data transmission control step of transmitting to the printer all pages determined as adaptive in said adaptability determining step prior to a page determined as disadaptive in said adaptability determining step.

[Claim 18]

The print control method according to claim 17, characterized in that said image data storing step does not store the image data until a page determined as disadaptive in said adaptability determining step is detected.

[Claim 19]

A print control apparatus connected to a printer over a two-way communication interface, characterized by comprising:

image data storage means for temporarily storing

image data including a plurality of pages to be
transmitted to the printer;

page information extraction means for extracting
setting information about a printer appropriate for
5   printing for each page of image data;

status information acquisition means for acquiring
printer status information indicating the printer
setting state;

adaptability determination means for determining
10   adaptability of the printer status information acquired
from the printer to the setting information about the
printer on each page extracted by said page information
extraction means; and

image data transmission control means for
15   transmitting to the printer all pages determined as
adaptive by said adaptability determination means prior
to a page determined as disadaptive by said
adaptability determination means.

[Claim 20]

20   The print control apparatus according to claim 19,
characterized in that said image data storage means
does not store the image data until a page determined
as disadaptive by said adaptability determination means
is detected.

25   [Claim 21]

A print control method for print control of a
printer connected through a two-way communication

interface, characterized by comprising:

a setting information adding step of adding setting information about a printer appropriate for printing each page configuring image data to a head of the image data formed by a plurality of pages to be transmitted to the printer;

a setting information extracting step of retrieving the setting information about the printer added in said setting information adding step;

a status information acquiring step of acquiring printer status information indicating a setting state of the printer;

an adaptability determining step of determining adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted in said setting information extracting step; and

an image data transmission control step of transmitting to the printer all pages determined as adaptive in said adaptability determining step prior to a page determined as disadaptive in said adaptability determining step.

[Claim 22]

A print control apparatus connected to a printer over a two-way communication interface, characterized by comprising:

setting information addition means for adding

setting information about a printer appropriate for printing each page configuring image data to a head of the image data formed by a plurality of pages to be transmitted to the printer;

5 setting information extraction means for retrieving the setting information about the printer added by said setting information addition means;

status information acquisition means for acquiring printer status information indicating a setting state

10 of the printer;

adaptability determination means for determining adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted by said setting

15 information extraction means; and

image data transmission control means for transmitting to the printer all pages determined as adaptive by said adaptability determination means prior to a page determined as disadaptive by said

20 adaptability determination means.

[Claim 23]

A computer-readable recording medium storing a program for controlling a print control apparatus connected to a printer over a two-way communication

25 interface, and for use to direct a computer to perform the process comprising:

a status information acquiring step of

periodically acquiring printer status information indicating a printer setting state from the printer;

a print data converting step of converting document data into print data as a set of printer commands based on various setting contents input by a user;

a page information recording step of recording for each job on a storage device the setting contents input by the user for each page when the print data is generated in said print data converting step;

a setting information comparing step of comparing the printer status information acquired in said status information acquiring step with the setting contents of each page of the job recorded in said page information recording step each time the printer status information is updated or a new job is added, and determining whether or not each job can be printed on the printer;

a job transmission control step of temporarily holding transmission to the printer of a job determined as unprintable in said setting information comparing step, but not holding transmission to the printer of a job determined as printable in said setting information comparing step; and

a comparison result display step of displaying a matching status between the printer status information about the printer and the setting contents of each page of the job.

[Claim 24]

A computer-readable recording medium storing a program for controlling a print control apparatus connected to a printer over a two-way communication interface, and for use to direct a computer to perform the process comprising:

a status information acquiring step of acquiring printer status information indicating the setting state of the printer;

an intermediate data converting step of converting document data into intermediate data as a set of intermediate commands and storing the intermediate data on a storage device;

an intermediate data selecting step of selecting intermediate data to be converted into print data as a set of a printer commands from among a plurality of pieces of intermediate data stored on the storage device in said intermediate data converting step based on the printer status information acquired in said status information acquiring step; and

a print data transmitting step of converting the intermediate data selected in said intermediate data selecting step into print data, and transmitting the print data to a specified printer.

[Claim 25]

A computer-readable recording medium storing a program for controlling a print control apparatus

connected to a printer over a two-way communication interface, and for use to direct a computer to perform the process comprising:

an image data storing step of temporarily storing image data including a plurality of pages to be transmitted to the printer;

a page information extracting step of extracting setting information about a printer appropriate for printing for each page of image data;

a status information acquiring step of acquiring printer status information indicating a printer setting state;

an adaptability determining step of determining adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted in said page information extracting step; and

an image data transmission control step of transmitting to the printer all pages determined as adaptive in said adaptability determining step prior to a page determined as disadaptive in said adaptability determining step.

[Claim 26]

A computer-readable recording medium storing a program for controlling a print control apparatus connected to a printer over a two-way communication interface, and for use to direct a computer to perform

the process comprising:

a setting information adding step of adding setting information about a printer appropriate for printing each page configuring image data to a head of the image data formed by a plurality of pages to be transmitted to the printer;

a setting information extracting step of retrieving the setting information about the printer added in said setting information adding step;

a status information acquiring step of acquiring printer status information indicating a setting state of the printer;

an adaptability determining step of determining adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted in said setting information extracting step; and

an image data transmission control step of transmitting to the printer all pages determined as adaptive in said adaptability determining step prior to a page determined as disadaptive in said adaptability determining step.

[Claim 27]

A program for controlling a print control apparatus connected to a printer over a two-way communication interface, and for use to direct a computer to perform the process comprising:

a status information acquiring step of
periodically acquiring printer status information
indicating a printer setting state from the printer;

a print data converting step of converting
document data into print data as a set of printer
commands based on various setting contents input by a
user;

a page information recording step of recording for
each job on a storage device the setting contents input
by the user for each page when the print data is
generated in said print data converting step;

a setting information comparing step of comparing
the printer status information acquired in said status
information acquiring step with the setting contents of
each page of the job recorded in said page information
recording step each time the printer status information
is updated or a new job is added, and determining
whether or not each job can be printed on the printer;

a job transmission control step of temporarily
holding transmission to the printer of a job determined
as unprintable in said setting information comparing
step, but not holding transmission to printer of a job
determined as printable in said setting information
comparing step; and

a comparison result display step of displaying a
matching status between the printer status information
about the printer and the setting contents of each page

of the job.

[Claim 28]

A program for controlling a print control apparatus connected to a printer over a two-way communication interface, and for use to direct a computer to perform the process comprising:

a status information acquiring step of acquiring printer status information indicating the setting state of the printer;

an intermediate data converting step of converting document data into intermediate data as a set of intermediate commands and storing the intermediate data on a storage device;

an intermediate data selecting step of selecting intermediate data to be converted into print data as a set of printer commands from among a plurality of pieces of intermediate data stored on the storage device in said intermediate data converting step based on the printer status information acquired in said status information acquiring step; and

a print data transmitting step of converting the intermediate data selected in said intermediate data selecting step into print data, and transmitting the print data to a specified printer.

[Claim 29]

A program for controlling a print control apparatus connected to a printer over a two-way

communication interface, and for use to direct a
computer to perform the process comprising:

an image data storing step of temporarily storing
image data including a plurality of pages to be
5   transmitted to the printer;

a page information extracting step of extracting
setting information about a printer appropriate for
printing for each page of image data;

a status information acquiring step of acquiring
10   printer status information indicating a printer setting
state;

an adaptability determining step of determining
adaptability of the printer status information acquired
from the printer to the setting information about the
15   printer on each page extracted in said page information
extracting step; and

an image data transmission control step of
transmitting to the printer all pages determined as
adaptive in said adaptability determining step prior to
20   a page determined as disadaptive in said adaptability
determining step.

[Claim 30]

A program for controlling a print control
apparatus connected to a printer over a two-way
25   communication interface, and for use to direct a
computer to perform the process comprising:

a setting information adding step of adding

setting information about a printer appropriate for printing each page configuring image data to a head of the image data formed by a plurality of pages to be transmitted to the printer;

5   a setting information extracting step of retrieving the setting information about the printer added in said setting information adding step;

a status information acquiring step of acquiring printer status information indicating a setting state

10   of the printer;

an adaptability determining step of determining adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted in said setting

15   information extracting step; and

an image data transmission control step of transmitting to the printer all pages determined as adaptive in said adaptability determining step prior to a page determined as disadaptive in said adaptability

20   determining step.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a print control

25   method and a print control apparatus, and more specifically to a print control method for a host computer etc. for transferring image data to a printer

and a print control apparatus.

[0002]

[Conventional Art]

Data including characters, graphics, and images generated by an application program of a computer or the like is printed on a printer connected to a computer over a network, or on a printer connected to another computer connected to the same network.

[0003]

A printer that receives image record data transferred from a computer and prints an image according to the image record data can have the function of returning to a host computer through a two-way communication interface at a request from the computer the information about a type of print head attached to the printer, the size and type of paper set on the printer, various switches, setting state of a lever, various errors and warnings about the printer, the printer status information such as printing and cleaning processes, etc.

[0004]

For example, the information indicating that a head for color printing is attached is returned when a print head for color printing is attached to a printer body, the information indicating that A4 plain paper is set is returned when the A4 plain paper is set on the printer body, paper type selection lever setting

position information corresponding to the setting position of the paper type selection lever of the printer body, etc. are returned according to predetermined format data.

5　[0005]

When there is an out-of-paper error or a paper jam error occurring on a printer, the information indicating each error is returned. That is, when an alarm that printer ink is getting low is raised, the

10　information that printer ink is getting low is returned. When the printer is performing a printing process, the information indicating a printing state is returned. When the printer is performing a cleaning process, the information indicating a cleaning state is returned.

15　The information is returned based on predetermined format data.

[0006]

For the above-mentioned printer, a printer status acquiring program has been used for display of printer

20　status information on a screen using graphics and characters by detecting a printer setting state on a computer. A printer status acquiring program is provided as a part of the function of a printer driver operating on the computer or as a utility program

25　independent of the printer driver. The printer status acquiring program is designed enable a printer setting state etc. to be confirmed on the computer without

confirming on a printer body. In addition, the printer
status acquiring program can have the function of
automatically setting a part of the settings to be
performed by a user on the printer driver in
5   cooperation with the printer driver so that the part
can match the status of the printer.
[0007]

    On the other hand, the printer driver converts
data such as documents etc. generated by an application
10   program etc. into print data as a set of printer
commands. A process of converting data such as
documents into print data can be classified into a
process at a preceding stage for storing various draw
instructions to be transmitted from an application
15   program as intermediate data of a set of intermediate
codes on a storage device, and a process at a
subsequent stage for converting the intermediate data
into print data as a set of printer commands.
[0008]

20   A printer driver is well known as having the
function of performing the preceding and subsequent
processes separately. The function can finish the
process at the preceding process relating to the
application program within a short time period,
25   completes the printing process of the application
program, and then performs the subsequent process that
normally require a longer time period independently of

the application program, thereby quickly releasing the
application program, and enhancing the convenience of a
user. The subsequent process is to convert
intermediate data into print data piece by piece, and
5   cannot simultaneously convert a plurality of pieces of
intermediate data.
[0009]
    Furthermore, when performing a printing process
from a computer to a printer connected over a network
10   or from a computer to a printer connected to another
computer connected to the same network, there is the
possibility that the image data to be printed is not
adaptive to the settings of the printer.
Conventionally, by a print data control program on the
15   computer to which a printer is connected detecting such
an disadaptive status and stopping the transmission of
the image data to the printer until the disadaptive
status can be solved, it can be avoided that the
printing process is performed with the image data
20   disadaptive to the printer settings. Furthermore, when
the settings of the printer are changed and the
disadaptive state is avoided, the stopped data
transmission can be resumed.
[0010]
25   [Problems to be Solved by the Invention]
    However, in the conventional printer status
display, although a user erroneously issues a print

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instruction by settings different from the display
contents, there is no means for stopping the
transmission of a print job by the erroneous print
instruction. Therefore, a printing process is

5   performed by erroneous settings.
[0011]

    In addition, the printer status acquiring program
having the function of automatically setting a printer
driver in accordance with the settings of a printer has

10 the problem that although the settings of the printer
driver are in accordance with the settings of the
printer when a user issues a print instruction, the
settings of the printer can be then changed when the
print job is stored in a spooler, and a print job can

15 be transmitted with the settings different from the
settings of the printer when a print job is transmitted
to the printer.
[0012]

    Thus, there is a well known method of comparing

20 the settings of a printer with the settings of each
print job immediately before transmitting each print
job transmitted from the spooler of the operating
system (OS), and waiting for the execution of an
operation of a user changing the settings of the

25 printer to comply with the settings of the print job
with the transmission of the print job held if the
settings do not match, or canceling the print job.

[0013]

However, there has been the problem with this method that since a print job transmitted from a spooler is processed immediately before transmitting the print job to a printer, the settings of a printer are to be first changed to comply with the settings of a print job or the print job is to be first cancelled before processing another print job. If the other print job whose settings comply with the settings of the printer is spooled after the current print job, the subsequent job cannot be processed until process of the print job that is being held and has not been transmitted yet ends, thereby performing an inefficient process.

[0014]

The present invention has been made to solve the problem, and aims at providing a print control method and a print control apparatus capable of avoiding the transmission of a print job to a printer in a printing operation performed by erroneous settings different from the settings of the printer and holding the transmission of the print job, thereby avoiding a case in which another print job cannot be transmitted.

[0015]

On the other hand, the process of converting data such as a document etc. into print data is serially performing the process of converting intermediate data

into print data in the order in which the intermediate data is generated. Therefore, although a printing operation is to be performed on a printer in a state in which an error occurs and the printing operation cannot be immediately started, the conversion from intermediate data to print data has been performed on a priority basis if the intermediate data is first generated. Since it normally takes a long time to generate print data, the print data is to be generated for a printer that can perform the printing operation on a priority basis. However, in the print data generating process by a conventional printer driver cannot perform the above-mentioned priority control.

[0016]

In addition, when generated print data is not spooled as a spool file but is transmitted as is to a printer, and when the print data generating process is first performed on a printer in which an error has occurred, the print data generating process on another printer in which no error occurs is not performed until the printer error is solved and the printing operation is completed.

[0017]

The present invention has been made to solve the above-mentioned problems, and aims at providing a print control method and a print control apparatus capable of improving the efficiency of the printing process of the

entire system when there are a plurality of pieces of intermediate data to be converted into print data.

[0018]

Furthermore, when the above-mentioned print data control program detects the disadaptivity between image data and the settings of a printer in a plurality of pages to be printed, it stops the transmission of all image data to the printer until the disadaptivity is solved. If the page subsequent to the page on which the disadaptivity has been detected has image data adaptive to the settings of the printer, then the settings of the printer are to be changed to print the page on which the disadaptivity has been detected. Then, to print the page that complies with the settings of the printer, the settings of the printer are to be restored to the original state, thereby requiring double operations. Additionally, in a job in which adaptive pages and disadaptive pages coexist in an arbitrary order, the above-mentioned operation repeatedly occurs, and the operations of a user are complicated until the end of the printing operation.

[0019]

The present invention has been made to solve the above-mentioned problems and aims at providing a print control method and a print control apparatus capable of reducing the frequency of changing printer settings of a user by transmitting all pages adaptive to the

printer settings prior to a disadaptive page, thereby
reducing the complexity.

[0020]

[Means for Solving the Problems]

To attain the above-mentioned objectives, the
present invention according to claim 1 is a print
control method for print control of a printer connected
through a two-way communication interface, and is
characterized by including: a status information
acquiring step of periodically acquiring printer status
information indicating a printer setting state from the
printer; a print data converting step of converting
document data into print data as a set of printer
commands based on various setting contents input by a
user; a page information recording step of recording
for each job on a storage device the setting contents
input by the user for each page when the print data is
generated in the print data converting step; a setting
information comparing step of comparing the printer
status information acquired in the status information
acquiring step with the setting contents of each page
of the job recorded in the page information recording
step each time the printer status information is
updated or a new job is added, and determining whether
or not each job can be printed on the printer; a job
transmission control step of temporarily holding
transmission to the printer of a job determined as

unprintable in the setting information comparing step,
but not holding transmission to the printer of a job
determined as printable in the setting information
comparing step; and a comparison result display step of
displaying a matching status between the printer status
information about the printer and the setting contents
of each page of the job.

[0021]

In the invention according to claim 2, the status
information acquiring step according to claim 1 is
characterized by acquiring, over a network, status
information about a printer connected over the network.

[0022]

In the invention according to claim 3, the status
information acquiring step according to claim 1 is
characterized by acquiring status information about
another printer connected to another print control
apparatus over a network from the another print control
apparatus over the network.

[0023]

In the invention according to claim 4, the setting
contents of each page according to claim 1, 2, or 3 is
characterized by referring to one of a type of print
head, paper information, and a lever position.

[0024]

The invention according to claim 5 is a print
control apparatus connected to a printer over a two-way

communication interface, and is characterized by
including: status information acquisition means for
periodically acquiring printer status information
indicating a printer setting state from the printer;

5 print data conversion means for converting document
data into print data as a set of printer commands based
on various setting contents input by a user; page
information record means for recording for each job on
a storage device the setting contents input by the user

10 for each page when the print data is generated by the
print data conversion means; setting information
comparison means for comparing the printer status
information acquired by the status information
acquisition means with the setting contents of each

15 page of the job recorded by the page information
recording means each time the printer status
information is updated or a new job is added, and
determining whether or not each job can be printed on
the printer; job transmission control means for

20 temporarily holding transmission to the printer of a
job determined as unprintable by the setting
information comparison means, but not holding
transmission to the printer of a job determined as
printable by the setting information comparison means;

25 and comparison result display means for displaying a
matching status between the printer status information
about the printer and the setting contents of each page

of the job.

[0025]

In the invention according to claim 6, the status information acquisition means according to claim 5 is characterized by acquiring, over a network, status information about a printer connected over the network.

[0026]

In the invention according to claim 7, the status information acquisition means according to claim 5 is characterized by acquiring status information about another printer connected to another print control apparatus over a network from the another print control apparatus over the network.

[0027]

In the invention according to claim 8, the setting contents of each page according to claim 5, 6, or 7 is characterized by referring to one of a type of print head, paper information, and a lever position.

[0028]

The invention according to claim 9 is a print control method for print control of a printer connected through a two-way communication interface, and is characterized by including: a status information acquiring step of acquiring printer status information indicating the setting state of the printer; an intermediate data converting step of converting document data into intermediate data as a set of

intermediate commands and storing the intermediate data on a storage device; an intermediate data selecting step of selecting intermediate data to be converted into print data as a set of a printer commands from

5 among a plurality of pieces of intermediate data stored on the storage device in the intermediate data converting step based on the printer status information acquired in the status information acquiring step; and a print data transmitting step of converting the

10 intermediate data selected in the intermediate data selecting step into print data, and transmitting the print data to a specified printer.

[0029]

In the invention according to claim 10, the status

15 information acquiring step according to claim 9 is characterized by acquiring, over a network, status information about a printer connected over the network.

[0030]

In the invention according to claim 11, the status

20 information acquiring step according to claim 9 is characterized by acquiring status information about another printer connected to another print control apparatus over a network from the another print control apparatus over the network.

25 [0031]

In the invention according to claim 12, the intermediate data selecting step according to claim 9,

10, or 11 is characterized by selecting on a priority basis intermediate data for a printer which can normally perform communications and is not in an error state, an alarm state, or a printing state.

[0032]

The invention according to claim 13 is a print control apparatus connected to a printer over a two-way communication interface, and is characterized by including: status information acquisition means for acquiring printer status information indicating the setting state of the printer; intermediate data conversion means for converting document data into intermediate data as a set of intermediate commands and storing the intermediate data on a storage device; intermediate data selection means for selecting intermediate data to be converted into print data as a set of printer commands from among a plurality of pieces of intermediate data stored on the storage device by the intermediate data conversion means based on the printer status information acquired by the status information acquisition means; and print data transmission means for converting the intermediate data selected by the intermediate data selection means into print data, and transmitting the print data to a specified printer.

[0033]

In the invention according to claim 14, the status

information acquisition means according to claim 13 is characterized by acquiring, over a network, status information about a printer connected over the network.

[0034]

In the invention according to claim 15, the status information acquisition means according to claim 13 is characterized by acquiring status information about another printer connected to another print control apparatus over a network from the another print control apparatus over the network.

[0035]

In the invention according to claim 16, the intermediate data selection means according to claim 13, 14, or 15 is characterized by selecting on a priority basis intermediate data for a printer which can normally perform communications and is not in an error state, an alarm state, or a printing state.

[0036]

The invention according to claim 17 is a print control method for print control of a printer connected through a two-way communication interface, and is characterized by including: an image data storing step of temporarily storing image data including a plurality of pages to be transmitted to the printer; a page information extracting step of extracting setting information about a printer appropriate for printing for each page of image data; a status information

acquiring step of acquiring printer status information
indicating a printer setting state; an adaptability
determining step of determining adaptability of the
printer status information acquired from the printer to

5   setting information about the printer on each page
extracted in the page information extracting step; and
an image data transmission control step of transmitting
to the printer all pages determined as adaptive in the
adaptability determining step prior to a page

10 determined as disadaptive in the adaptability
determining step.

[0037]

In the invention according to claim 18, the image
data storing step according to claim 17 is

15 characterized by not storing the image data until a
page determined as disadaptive in the adaptability
determining step is detected.

[0038]

The invention according to claim 19 is a print

20 control apparatus connected to a printer over a two-way
communication interface, and is characterized by
including: image data storage means for temporarily
storing image data including a plurality of pages to be
transmitted to a printer; page information extraction

25 means for extracting setting information about a
printer appropriate for printing for each page of image
data; status information acquisition means for

acquiring printer status information indicating the
printer setting state; adaptability determination means
for determining adaptability of the printer status
information acquired from the printer to the setting
5   information about the printer on each page extracted by
the page information extraction means; and image data
transmission control means for transmitting to the
printer all pages determined as adaptive by the
adaptability determination means prior to a page
10   determined as disadaptive by the adaptability
determination means.
[0039]

      In the invention according to claim 20, the image
data storage means according to 19 is characterized by
15   not storing the image data until a page determined as
disadaptive by the adaptability determination means is
detected.
[0040]

      The invention according to claim 21 is a print
20   control method for print control of a printer connected
through a two-way communication interface, and is
characterized by including: a setting information
adding step of adding setting information about a
printer appropriate for printing each page configuring
25   image data to a head of the image data formed by a
plurality of pages to be transmitted to the printer; a
setting information extracting step of retrieving the

setting information about the printer added in the setting information adding step; a status information acquiring step of acquiring printer status information indicating a setting state of the printer; an

5   adaptability determining step of determining adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted in the setting information extracting step; and an image data

10   transmission control step of transmitting to the printer all pages determined as adaptive in the adaptability determining step prior to a page determined as disadaptive in the adaptability determining step.

15   [0041]

     The invention according to claim 22 is a print control apparatus connected to a printer over a two-way communication interface, and is characterized by including: setting information addition means for

20   adding setting information about a printer appropriate for printing each page configuring image data to a head of the image data formed by a plurality of pages to be transmitted to the printer; setting information extraction means for retrieving the setting information

25   about the printer added by the setting information addition means; status information acquisition means for acquiring printer status information indicating a

setting state of the printer; adaptability
determination means for determining adaptability of the
printer status information acquired from the printer to
the setting information about the printer on each page
5   extracted by the setting information extraction means;
and image data transmission control means for
transmitting to the printer all pages determined as
adaptive by the adaptability determination means prior
to a page determined as disadaptive by the adaptability
10   determination means.

[0042]

The invention according to claim 23 is
characterized by being a computer-readable recording
medium storing a program for controlling a print
15   control apparatus connected to a printer over a two-way
communication interface, and for use to direct a
computer to perform the process including: a status
information acquiring step of periodically acquiring
printer status information indicating a printer setting
20   state from the printer; a print data converting step of
converting document data into print data as a set of
printer commands based on various setting contents
input by a user; a page information recording step of
recording for each job on a storage device the setting
25   contents input by the user for each page when the print
data is generated in the print data converting step; a
setting information comparing step of comparing the

printer status information acquired in the status
information acquiring step with the setting contents of
each page of the job recorded in the page information
recording step each time the printer status information
5   is updated or a new job is added, and determining
whether or not each job can be printed on the printer;
a job transmission control step of temporarily holding
transmission to the printer of a job determined as
unprintable in the setting information comparing step,
10 but not holding transmission to the printer of a job
determined as printable in the setting information
comparing step; and a comparison result display step of
displaying a matching status between the printer status
information about the printer and the setting contents
15 of each page of the job.

[0043]

    The invention according to claim 24 is
characterized by being a computer-readable recording
medium storing a program for controlling a print
20 control apparatus connected to a printer over a two-way
communication interface, and for use to direct a
computer to perform the process including: a status
information acquiring step of acquiring printer status
information indicating the setting state of the
25 printer; an intermediate data converting step of
converting document data into intermediate data as a
set of intermediate commands and storing the

intermediate data on a storage device; an intermediate
data selecting step of selecting intermediate data to
be converted into print data as a set of a printer
commands from among a plurality of pieces of

5   intermediate data stored on the storage device in the
intermediate data converting step based on the printer
status information acquired in the status information
acquiring step; and a print data transmitting step of
converting the intermediate data selected in the

10 intermediate data selecting step into print data, and
transmitting the print data to a specified printer.
[0044]

The invention according to claim 25 is
characterized by being a computer-readable recording

15 medium storing a program for controlling a print
control apparatus connected to a printer over a two-way
communication interface, and for use to direct a
computer to perform the process including: an image
data storing step of temporarily storing image data

20 including a plurality of pages to be transmitted to the
printer; a page information extracting step of
extracting setting information about a printer
appropriate for printing for each page of image data; a
status information acquiring step of acquiring printer

25 status information indicating a printer setting state;
an adaptability determining step of determining
adaptability of the printer status information acquired

from the printer to the setting information about the
printer on each page extracted in the page information
extracting step; and an image data transmission control
step of transmitting to the printer all pages

5   determined as adaptive in the adaptability determining
step prior to a page determined as disadaptive in the
adaptability determining step.

[0045]

      The invention according to claim 26 is

10   characterized by being a computer-readable recording
medium storing a program for controlling a print
control apparatus connected to a printer over a two-way
communication interface, and for use to direct a
computer to perform the process including: a setting

15   information adding step of adding setting information
about a printer appropriate for printing each page
configuring image data to a head of the image data
formed by a plurality of pages to be transmitted to the
printer; a setting information extracting step of

20   retrieving the setting information about the printer
added in the setting information adding step; a status
information acquiring step of acquiring printer status
information indicating a setting state of the printer;
an adaptability determining step of determining

25   adaptability of the printer status information acquired
from the printer to the setting information about the
printer on each page extracted in the setting

information extracting step; and an image data transmission control step of transmitting to the printer all pages determined as adaptive in the adaptability determining step prior to a page

5   determined as disadaptive in the adaptability determining step.

[0046]

    The invention according to claim 27 is characterized by being a program for controlling a

10   print control apparatus connected to a printer over a two-way communication interface, and for use to direct a computer to perform the process including: a status information acquiring step of periodically acquiring printer status information indicating a printer setting

15   state from the printer; a print data converting step of converting document data into print data as a set of printer commands based on various setting contents input by a user; a page information recording step of recording for each job on a storage device the setting

20   contents input by the user for each page when the print data is generated in the print data converting step; a setting information comparing step of comparing the printer status information acquired in the status information acquiring step with the setting contents of

25   each page of the job recorded in the page information recording step each time the printer status information is updated or a new job is added, and determining

whether or not each job can be printed on the printer;
a job transmission control step of temporarily holding
transmission to the printer of a job determined as
unprintable in the setting information comparing step,
5 but not holding transmission to printer of a job
determined as printable in the setting information
comparing step; and a comparison result display step of
displaying a matching status between the printer status
information about the printer and the setting contents
10 of each page of the job.

[0047]

The invention according to claim 28 is
characterized by being a program for controlling a
print control apparatus connected to a printer over a
15 two-way communication interface, and for use to direct
a computer to perform the process including: a status
information acquiring step of acquiring printer status
information indicating the setting state of the
printer; an intermediate data converting step of
20 converting document data into intermediate data as a
set of intermediate commands and storing the
intermediate data on a storage device; an intermediate
data selecting step of selecting intermediate data to
be converted into print data as a set of printer
25 commands from among a plurality of pieces of
intermediate data stored on the storage device in the
intermediate data converting step based on the printer

status information acquired in the status information acquiring step; and a print data transmitting step of converting the intermediate data selected in the intermediate data selecting step into print data, and

5   transmitting the print data to a specified printer.
[0048]

The invention according to claim 29 is characterized by being a program for controlling a print control apparatus connected to a printer over a

10 two-way communication interface, and for use to direct a computer to perform the process including: an image data storing step of temporarily storing image data including a plurality of pages to be transmitted to the printer; a page information extracting step of

15 extracting setting information about a printer appropriate for printing for each page of image data; a status information acquiring step of acquiring printer status information indicating a printer setting state; an adaptability determining step of determining

20 adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted in the page information extracting step; and an image data transmission control step of transmitting to the printer all pages

25 determined as adaptive in the adaptability determining step prior to a page determined as disadaptive in the adaptability determining step.

[0049]

The invention according to claim 30 is characterized by being a program for controlling a print control apparatus connected to a printer over a two-way communication interface, and for use to direct a computer to perform the process including: a setting information adding step of adding setting information about a printer appropriate for printing each page configuring image data to a head of the image data formed by a plurality of pages to be transmitted to the printer; a setting information extracting step of retrieving the setting information about the printer added in the setting information adding step; a status information acquiring step of acquiring printer status information indicating a setting state of the printer; an adaptability determining step of determining adaptability of the printer status information acquired from the printer to the setting information about the printer on each page extracted in the setting information extracting step; and an image data transmission control step of transmitting to the printer all pages determined as adaptive in the adaptability determining step prior to a page determined as disadaptive in the adaptability determining step.

[0050]

[Embodiments of the Invention]

- 47 -

The embodiments of the present invention are described below in detail with reference to the attached drawings. Described first below is the print control method for preventing a print job in a printing

5   operation performed with settings different from printer settings from being transmitted to the printer to hold the transmission of the print job, thereby avoiding an event in which another print job cannot be transmitted.

10   [0051]

Figure 1 is a block diagram showing a print system to which the print control apparatus according to an embodiment of the present invention is applied. The print system is configured by a host computer 1001

15   provided as a print control apparatus, and printers 2001 and 2100 connected to the host computer 1001.
[0052]

The host computer 1001 outputs as images the data including characters, graphics, and images generated by

20   an application program in a hard disk described later to the printers 2001 and 2100 through a printer driver and a print data transmission control program on the same hard disk. The printers 2001 and 2100 receive image data from the host computer 1001, record images

25   on recording paper, and also transmit data such as setting states etc. of the printers 2001 and 2100 to the host computer 1001.

[0053]

Connected via a common bus 1014 in the host
computer 1001 are a CPU 1002 for control of the host
computer body 1100, RAM 1003 into which a program
operated in the host computer 1001 is loaded and which
is used as work memory during the operation of the
program, and ROM 1006 storing a program, data, etc.
used to execute various programs on the host computer
1001, control various controllers, and font data etc.
used in displaying information on a CRT 1012.

[0054]

A hard disk 1004 stores an operating system and an
application program, various programs for a printer
driver, a print data transmission control program, etc.
for generating image data and print job information to
be transferred to a printer, necessary data when each
program is operated, tables shown in Figures 3 to 5,
and the print job information shown in Figures 9 and 12.
The hard disk 1004 is connected to the common bus 1014
by a hard disk controller 1005.

[0055]

Also connected to the common bus 1014 are data
input/output controllers 1013 and 1015 for transferring
a command and data generated by a printer driver to a
printer and receiving and temporarily holding data
transmitted from the printer, a keyboard controller
1007 for accepting user key input from a keyboard 1010

connected to the host computer body 1100, a mouse

controller 1008 for accepting user input through a

mouse 1011 of the host computer 1001, and a CRT

controller 1009 for controlling display on the CRT 1012

5   for display. The data input/output controllers 1013

and 1015 are connected to the printers 2001 and 2100

for communicating data with the printers 2001 and 2100.

[0056]

A user uses the CRT 1012, the keyboard 1010, and

10   the mouse 1011 to perform an interactive operation to

generate print data, issue a print instruction, etc.

for the host computer 1001.

[0057]

Connected via a common bus in the printer 2001 are

15   a CPU 2003 for controlling a printer body, a data

input/output controller 2002 for receiving image data

transferred from the host computer 1001 to the printer

2001 and transferring information from the printer side

to the host computer 1001, and program ROM 2004 storing

20   a program for performing a series of printing

operations in which image data received from the host

computer 1001 is output.

[0058]

Also connected via the common bus are frame memory

25   2005 for holding an image pattern generated by a

program in the program ROM 2004, a work memory 2006

used in various image recording processes including a

process of drawing image data, and a communication process with the host computer 1001, and a color image recording unit 2007 for recording on paper the image pattern held in the frame memory 2005.

[0059]

The printer 2001 supports the function of transmitting the information about a printer setting state (status information) to a host computer. Upon receipt of a request to send the status information from the host computer, the printer 2001 transmits to the host computer the paper size set on the printer and the type of recording head (cartridge). The transmitted data format of the status information of the printer is shown in Figure 24, and is described later.

[0060]

The data input/output controller 1006 configures status information acquisition means for acquiring the status information about the printer from the printer 2001, and image data transmission means for transferring image data to the printer 2001. The CPU 1002 configures adaptability determination means for determining the adaptability between the image data and the status information about the printer. The hard disk 1004 configures image data storage means for temporarily storing the image data whose transmission to the printer is held as necessary depending on the

result of the adaptability determination.

[0061]

Figure 2 is a flowchart of the print data transmission control program in the print control method according to an embodiment of the present invention. Described below is the processing operation of the print data transmission control program in the host computer 1001.

[0062]

When a user performs an printing operation on the host computer 1001 and a printer driver is called by the operating system, the printer driver starts generating print data, generates print job information, and then activates the print data transmission control program and starts executing the program. If the print data transmission control program has been executed when the printer driver generates the print job information about each print job, the printer driver does not perform the process of activating the print data transmission control program. Afterwards, the print data transmission control program monitors the setting states of the connected printers 2001 and 2100.

[0063]

In the processing operation of the print data transmission control program, an initializing process is first performed (step S201). In the initializing process, each table stored in the hard disk 1004,

described later with reference to Figures 3 to 5, is loaded into the work area of the RAM 1003.

[0064]

Figure 3 depicts a view illustrating a table showing the type of print head in the print control apparatus according to the embodiment of the present invention. It shows the correspondence between the "print head code" of the printer status information indicating the printer setting state, and the character string indicating the type of the corresponding print head. The value of the "print head code" and the value of the "print head setting" of the print page information are common values for each print head, and a character string indicating the type of a corresponding print head can also be acquired from the value of the print head setting of the print page information. The table is stored in the storage device of the host computer configuring the print control apparatus, and is referred to by the print data transmission control program according to the present embodiment.

[0065]

Figure 4 depicts a view illustrating a table showing the paper information in the print control apparatus according to the embodiment of the present invention. It shows the correspondence between the "paper information" of the printer status information

indicating the printer setting state and the character
string indicating the corresponding information about
paper. The 4-byte value of the paper information
indicates a paper size by upper 2 bytes, and the type

5 of paper by lower 2 bytes. The value of paper
information and the value of the "paper settings" of
the print page information are common values, and the
character strings indicating the corresponding paper
size and the type of paper can also be obtained from

10 the values of the paper settings of the print page
information with reference to the table. The table is
stored on the storage device of the host computer
configuring the print control apparatus, and is
referred to by the print data transmission control

15 program according to the present embodiment.
[0066]

Figure 5 depicts a view illustrating a table
showing the lever information in the print control
apparatus according to the embodiment of the present

20 invention. It shows the correspondence between the
"lever information" about the printer status
information indicating the printer setting state and
the character string indicating the position of the
corresponding lever. The value of the lever

25 information and the value of the "lever settings" of
the print page information are common values, and a
character string indicating the position of the

corresponding lever can also be obtained from the value

of the lever settings of the print page information.

The table is stored on the storage device of the host

computer configuring the print control apparatus, and

5   the print data transmission control program according

to the present embodiment is referred to.

[0067]

Next, in Figure 2, the information listing print

jobs in standby states is acquired from an operating

10   system, and is stored in the hard disk 1004 (step S202).

The information includes the job ID, the document name,

the name of the printer for printing, etc. According

to the information acquired in step S202, it is

determined whether or not there is a job on standby for

15   printing corresponding to the printers 2001 and 2100

(step S203). When there is no print job on standby for

printing, the process of the print data transmission

control program is terminated. When there is a job on

standby for printing, it is determined whether or not

20   there is a new print job not previously detected when

the presence/absence of a job on standby for printing

is confirmed (step S204).

[0068]

Figure 6 shows the display job management

25   information for management of a print job by the print

data transmission control program. Figure 6(a) shows

the data structure of the display job management

information, and Figure 6(b) shows an example of display job management information. The determination in step S204 is performed by acquiring a pointer indicating the head of the area storing the display job management information shown in Figure 6, and determining whether or not the job ID of each print job acquired in step S202 is included in the display job management information shown in Figure 6. In the initialized state immediately after the activation of the print data transmission control program, there is no registered display job management information. Therefore, there is no display job management information indicated by the pointer. When it is determined that there is no new job, control is passed to step S206.

[0069]

If it is determined in step S204 that there is a new print job, then an instruction is transmitted to a spooler to hold the transmission of a corresponding job (step S205) so as to prevent the print data from being transmitted to the printer before it is determined whether or not the settings of a print job conform to the settings of the printers 2001 and 2100.

[0070]

Next, in Figure 2, status information is acquired from the printers 2001 and 2100 (step S206).

[0071]

Figure 7 shows the printer setting information in the print control method according to the embodiment of the present invention. It shows in a predetermined format the contents of the information indicating the setting states of the printers 2001 and 2100 as printer setting information and to be returned to the host computer 1001. The printer setting information is configured by the error information (HDS) indicating the type of print head attached to the printers 2001 and 2100, the information (PPR) indicating the size and the type of paper set on the printers 2001 and 2100, and the information (LVS) indicating the setting state of the lever of the printers 2001 and 2100.

[0072]

Next, in Figure 2, it is determined (step S207) whether or not the status information acquired in step S206 has been changed from the status information that was previously obtained in step S206.

[0073]

Figure 8 shows the printer status management information for management of a print job by the print data transmission control program. Figure 8(a) shows the data structure of the printer status management information, and Figure 8(b) shows an example of the printer status management information. The determination in step S207 is performed by acquiring a pointer indicating the header of the printer status

management information shown in Figure 8, comparing the status information acquired from the printers 2001 and 2100 in step S206 with the printer status management information recorded as the status information about

5   the printers 2001 and 2100, and determining that the status of the printer has been changed from the status acquired previously if only a part has been changed. In the initialized state immediately after the activation of the print data transmission control

10   program, there is no registered printer status management information. Therefore, there is no printer status management information indicated by the pointer. In this case, the operation is performed by assuming that the status has been changed from the previous

15   status. If it is determined in step S207 that the status has not been changed from the previous status, it is assumed that a series of processes have been completed, and the processes from step S202 are repeated again.

20   [0074]

If it is determined in step S207 that the status has been changed from the previous status, the information about the printers 2001 and 2100 in the printer status management information is rewritten into

25   the status information acquired from the printers 2001 and 2100 in step S206 (step S208). If there is no printer status management information about the

printers 2001 and 2100 as in the case immediately after

the activation of the print data transmission control

program, the printer setting management information

about the printers 2001 and 2100 is newly provided, and

5   added to a list structure.

[0075]

    Figure 9 shows the print job information relating

to the settings of printer in the print control method

according to an embodiment of the present invention.

10   Figure 8(a) shows the data structure of the print job

information, and Figure 8(b) shows an example of the

print job information. The print job information is

generated when a printer generates print data, and is

referred to during the operation of the print data

15   transmission control program. The print job

information records the information on what printer

settings each print job to be transmitted to the

printer is to be printed by. The print job information

includes a job ID of each print job, the setting of the

20   type of a print head in the print job, the setting of

paper, the setting of a lever position, and the pointer

to the print job information about the next job.

[0076]

    The print job information is generated on the hard

25   disk 1004 or the RAM 1003 when the print data of each

job is generated depending on the settings of the type

of the print head, the size of paper, the type of paper,

the position of a lever, etc. set when the user issues
an instruction to print each job by the printer driver.
The job ID of each print job is an ID value acquired
from the operating system when print data is generated
5   by the printer driver. Based on the value, the print
job processed on the host computer can be uniquely
designated. Using the value, the job name of a print
job, and the name of a printer for printing a print job
can also be acquired. Furthermore, using the value,
10 the operating system can hold the transmission of a
corresponding print job to a spooler managed by the
operating system, can release the holding state, and
can suspend the process of the print job.
[0077]

15   Next, in Figure 2, the new status information is
compared with the contents of the print job information
shown in Figure 9, and it is determined whether or not
all print jobs in the spooler comply with the printer
setting state as the print jobs of the printers 2001
20 and 2100 (step S209). The determination is performed
by comparing the printer status management information
updated in step S208 with the contents of the print job
information shown in Figure 9.
[0078]

25   Depending on the result of the determination in
step S209, a list of print jobs described later with
reference to Figure 10 is displayed on the CRT 1012 of

the host computer 1001 (step S210). If the display

area of the list has been set, the display contents are

updated. If the display area has not been set

immediately after the activation of the print data

transmission control program, then a new display area

is set and a list of the print jobs are displayed there.

[0079]

Figure 10 shows a list of print jobs displayed by

the print data transmission control program. A list of

print jobs includes a document name of each print job,

the name of a printer for transmitting each print job,

and the difference between the setting of each print

job and the setting of the current printer displayed by

character strings. The document name of each print job

and the name of the printer for transmitting each print

job can be obtained from the list of jobs acquired in

step S202. The difference between the setting of each

print job and the setting of the current printer can be

acquired by obtaining a character string corresponding

to the set value of each item from the set value of the

print job and the set value in the printer by referring

to the tables shown in Figures 3 to 5 with respect to

an item determined as not complying with each other

after a result of a matching determination in step S209.

[0080]

Next, in Figure 2, if a print job determined as

matching the printer in setting state as a result of

matching determination in step S209 is in a

transmission held state, the held state is released.

The transmission of a print job determined as not

matching the printer in setting state is held (step

5   S211). The holding of transmission and the release of

holding state are performed by specifying the job ID

with respect to a spooler managed by the operating

system, and by instructing to hold or to release

holding. Afterwards, it is assumed that a series of

10   processes have been completed, and the processes from

step S202 are repeated again.

[0081]

     As described above, according to the present

embodiment, a change in setting state is detected while

15   checking the setting state of a printer connected to

the host computer 1001, the printer setting state is

compared with each print job requested for transmission

to the printer, a print job matching in settings is

transmission-enabled, and a print job not matching in

20   settings is transmission-held, thereby avoiding

erroneously transmitting a print job not matching the

printer settings to the printer, preventing other print

jobs from being processed with delay when there are

print jobs not matching the printer settings, and

25   serving a user with various settings and printing

convenience.

[0082]

Second described below is the print control method for improving the efficiency in printing process as an entire system when there are a plurality of pieces of intermediate data to be converted into print data.

[0083]

Figure 11 is a flowchart showing the process performed until a printer driver is called by the operating system and intermediate data is generated. The printer driver operates by being called by the operating system when a user performs a printing operation on the host computer 1001. At this time, the operating system issues a plurality of draw instructions to each page of the print job, and the printer driver generates an intermediate command corresponding to the draw instruction. When the intermediate command are completely generated for the entire job, a printer command is generated based on the intermediate commands, and transmitted to the spooler of the operating system. The printer driver cannot generate an intermediate command or a printer command simultaneously for two or more print jobs.

[0084]

In Figure 11, an intermediate data file is first generated (step S1101). The intermediate data file is to record the intermediate data of the job, and the file name is determined not to be the same as other file names. The intermediate data file records nothing

immediately after the process in step S1101.

[0085]

Next, an instruction from an operating system is received (step S1102). An instruction from the operating system includes a control instruction such as a print job termination instruction in addition to a draw instruction.

[0086]

Next, it is determined whether or not the process of a print job is to be terminated (step S1103). When a print job terminate instruction is issued in step S1102, the print job is terminated. The operating system issues the print job terminate instruction only after a draw instruction for an entire job is issued, and the call is not issued immediately after the start of the intermediate data generating process, that is, immediately after the process in step S1101.

[0087]

When a print job has not been completed, a draw instruction next transmitted from the operating system is converted into an intermediate command (step S1104). An intermediate command is, in many cases, corresponds one to one to a draw instruction. Therefore, the load of a converting process from a draw instruction to an intermediate command is low, and the processing time is short.

[0088]

Next, the intermediate command generated in step S1104 is recorded on the hard disk 1004 (step S1105). The intermediate command is recorded in the intermediate data file generated in step S1101. When the process in step S1104 is terminated, the process on one draw instruction is terminated, thereby returning control to step S102 again. The process is repeated until the job terminate instruction is transmitted from the operating system.

[0089]

If it is determined in step S1103 that a job terminate instruction is transmitted from the operating system, then control is passed to step S1106. In step S1106, the information about the job ID of the print job, the printer name, the job name, and the intermediate data file name are recorded on the hard disk 1004 as print job information.

[0090]

Figure 12 shows the print job information relating to the print data in the print control method according to the embodiment of the present invention. Figure 12(a) shows the data structure of print job information. Figure 12(b) shows an example of print job information. The print job information is generated when the printer driver generates intermediate data, and referred to when print data is generated. The print job information is the information indicating to which

printer each print job to be transmitted to the
printers 2001 and 2100 is being transmitted and what
name the job has. The print job information has the
job ID of each print job, the printer name of the

5   printer specified during the printing operation to
transmit a print job, a job name of the print job, the
file name of the file storing the intermediate data of
the print job, and the pointer to the print job
information of the next job.

10 [0091]

The print job information is generated on the hard
disk 1004 when the printer driver is called by the
operating system and generates intermediate data of
each job. The job ID of each print job is an ID value

15 acquired from the operating system when the printer
driver generates print data. A print job processed on
the host computer can be uniquely designated based on
the value. Also using the value, the job name of a
print job, and a printer name for printing the print

20 job can be acquired from the operating system.
[0092]

Next, it is determined whether or not the print
data generating process for converting intermediate
data into print data has been activated (step S1107).

25 If the print data generating process has been activated,
the intermediate data generating process is terminated.
If it is determined in step S1107 that the print data

generating process has not been activated, the
intermediate data generating process is terminated
after the print data generating process is activated
(step S1108).

5   [0093]

Figure 13 is a flowchart showing the process of
the printer driver referring to an intermediate data
file and generating print data. First, the print job
information on the hard disk 1004 is referenced (step

10 S1301). As a result of referring to the print job
information, it is determined whether or not there are
a plurality of pieces of intermediate data to be
converted into print data (step S1302).

[0094]

15 If it is determined in step S1302 that there are a
plurality of pieces of intermediate data, the printer
name of the print job information is referenced, and it
is determined whether or not all the a plurality of
pieces intermediate data correspond to the same printer

20 (step S1303). If it is determined that all of them do
not correspond to the same printer, then status
information is acquired from a plurality of printers as
the destinations of the intermediate data (step S1304).

[0095]

25 Next, the status information acquired in step 1304
is referenced, and if there is a printer whose status
information has been acquired, in which no error or

alarm has occurred, and which is not performing a
printing process, then the printer is determined as a
printer to which print data is to be transmitted next.
When there are a plurality of corresponding printers, a
printer corresponding to the print job information
closest to the root of the list structure as shown in
Figure 12 in the print job information corresponding to
the printers is selected as a printer to which print
data is to be transmitted next. In addition, if there
is no printer whose status information has been
acquired, in which no error or alarm has occurred, and
which is not performing the printing process, then the
printer corresponding to the print job information
closest to the root of the list structure as
exemplified in Figure 12 is determined as a printer to
which print data is to be transmitted next.
[0096]

Next, the contents of the intermediate data file
recorded in the print job information closest to the
root of the list structure as shown in Figure 12 in the
print job information corresponding to the printer
selected in step S1305 are converted into print data.
In the converting process, a special process for image
processing, allocating print, etc. is performed
depending on the function of each printer (step S1306).
[0097]

Next, the print data generated in step S1306 is

transmitted to the spooler of the operating system, or
to a corresponding printer (step S1307). Whether print
data is to be transmitted to a spooler or a printer
depends on the settings on the operating system. The
processes in step S1306 and S1307 can transmit print
data to a spooler or a printer after converting all
contents of the intermediate data file into print data,
or can serially transmit print data for which the
conversion is completed before contents of all print
data are completely converted into print data.

[0098]

If it is determined in step S1302 that there are
not a plurality of pieces of intermediate data, control
is passed to step S1308. It is determined in step
S1308 whether or not there is one or more pieces of
intermediate data. If it is determined that there is
one or more pieces of intermediate data, control is
passed to step S1306. On the other hand, if it is
determined in step S1308 that there is no intermediate
data, then the print data generating process is
terminated.

[0099]

If it is determined in step S1303 that all of a
plurality of pieces of intermediate data correspond to
the same printer, it is not necessary to select a
printer, and therefore control is passed to step S1306,
and the print data generating process is performed.

[0100]

When all print data is transmitted to a spooler or a printer in step S1307, the intermediate data file and print job information relating to the transmitted print jobs are deleted, control is then passed to step S1301, and similar processes are repeated on the print job.

[0101]

Thus, according to the present embodiment, the order of performing the print data generating process and the print data transmitting process of a plurality of print jobs is determined depending on the state of a printer while checking the state change of a plurality of printers connected to the host computer 1001, thereby performing the time-consuming print data generating process in order from the printer capable of printing. Thus, the efficiency of the printing process can be improved.

[0102]

Third, the print control method with the print system provided with two host computers is described below.

[0103]

Figure 14 is a block diagram of the print system provided with two host computers. The print system is configured by host computers 1401 and 1451 provided as print control apparatuses, and printers 1461 and 1462 connected to the host computers, and the host computers

1401 and 1451 are connected over a communication
circuit network 1471 such as a LAN etc.

[0104]

Connected in the host computers 1401 and 1451 via
a common bus 1415 are a CPU 1402 for controlling the
host computers 1401 and 1451, RAM 1403 into which an
operating system, an application program, a printer
driver, an output control program (these software units
are executed by the CPU 1402), etc. stored in a hard
disk 1404 are loaded through a hard disk drive
controller 1405, and ROM 1406 storing a program
(executed by the CPU 1402) for controlling each
controller described later and data for use in the
program.

[0105]

The hard disk 1404 storing the operating system,
the application program, the printer driver for
generating image record data to be transferred to a
printer described later, and a print data transmission
control program operated in the host computers 1401 and
1451 is connected via the common bus 1415 through the
HDD controller 1405.

[0106]

Also connected to the common bus 1014 are a CRT
controller 1408 for displaying a character and an image
on a CRT 1410 under the control of the CPU 1402, a
keyboard controller 1407 for accepting input from a

user of the host computers 1401 and 1451 through a keyboard 1409 under the control of the CPU 1402, a mouse controller 1416 for accepting input from a user of the host computers 1401 and 1451 through a mouse 1417 under the control of the CPU 1402, a sound controller 1411 for generating audio from a speaker 1412 under the control of the CPU 1402, and a data input/output controller 1414 for performing two-way communications with the printers 1461 and 1462 under the control of the CPU 1402.

[0107]

Furthermore, the host computers 1401 and 1451 is provided with a network controller 1413 for connection to the communication circuit network 1471.

[0108]

In the above-mentioned embodiment, one data input/output controller is provided, and one printer is connected thereto. However, in the present embodiment, the printers 1461 and 1462 are connected to each of the host computers 1401 and 1451 having the data input/output controller 1414.

[0109]

In addition, according to the present embodiment, the network controller 1413 is provided to enable the information communications to be performed with the host computers 1401 and 1451 through the communication circuit network 1471. That is, the print data in the

host computer 1401 can be transferred to the printer 1462 connected to the host computer 1451 through a communication circuit network 1471 to be printed.

[0110]

Figure 15 is a flowchart showing the print data transmission control program in the print system provided with two host computers. Steps S201 to S205 are the same as those shown in the flowchart in Figure 2.

[0111]

Next, the status information about the setting state is acquired from the printer connected to a local port (step S1506). Furthermore, the status information about a printer connected to another host computer over a network is acquired (step S1507). The print data transmission control program on each print control apparatus can transmit to another print control apparatus the status information in a setting state in the printer connected to a local port at a request from the print data transmission control program of the other print control apparatus on the network, that is, another host computer. If there is status information about a printer corresponding to managed printer status management information when there is a request to transmit status information from another print control apparatus, the status information is transmitted. If there is no status information corresponding to the

managed printer status management information, the status information is acquired from the printer and transmitted.

[0112]

Steps S207 to S211 are the same as those in the flowchart in Figure 2. When the settings of a printer are compared with the settings of a print job in step S209, the print job information about a print job on a spooler is stored only on the print control apparatus that have generated print data as a result of the transmission from another print control apparatus. Therefore, it is not used in the comparing process. However, since the comparing process with the settings of a printer is performed on the print control apparatus that has generated the print data, the print job having the settings not complying with the settings of the printer is not transmitted to the printer. In addition, when a transmission of a print job is held and the held transmission is released in step S211, the transmission of a print job can be held and the held transmission can be released by a source print control apparatus even for a print job to be transmitted to a printer connected to another print control apparatus on a network.

[0113]

Thus, according to the present embodiment, a change in setting state is detected while checking the

setting state of a printer connected to the host
computers 1401 and 1451, the setting state is compared
with the settings of each print job for which a
transmission to the printer is requested, the
transmission is enabled for a matching setting, and the
transmission is held for a non-matching setting,
thereby avoiding an erroneous transmission of a print
job not complying with the setting of the printer to
the printer, avoiding delayed processes of other jobs
due to the print job not complying with the settings of
the printer even between a plurality of host computers
connected over a network, and serving a user with
conveniences in printing with various settings.

[0114]

Figure 16 is a flowchart of the process of a
printer driver generating print data with reference to
an intermediate data file in a print system provided
with two host computers. In the print system provided
with the two host computers, the process of the
operating system calling the printer driver up to the
process of generating intermediate data are the same as
the processes shown in Figure 11.

[0115]

Steps S1301 to S1303 are the same as those shown
in flowchart in Figure 13. Next, status information is
acquired from the printer connected to the local port
(step S1604). Furthermore, to acquire the status

information of a printer connected to another host
computer over a network, a request for status
information about a printer connected to another host
computer over the network is issued to the host

5   computer (step S1605). When all printers corresponding
to the intermediate data are connected to local ports,
a request for status information is not issued to
another host computer.
[0116]

10   Next, the status information about the printer is
acquired from another host computer over the network
(step S1606). When the status information about a
printer cannot be acquired, it is assumed that
communications cannot be performed with the printer.

15   Steps S1305 to S1307 are the same as those shown in the
flowchart in Figure 13.
[0117]

     Thus, according to the present embodiment, by
determining the order of performing a print data

20   generating process and a print data transmitting
process on a plurality of print jobs while checking
changes in the state of printers connected to the host
computers 1401 and 1451 depending on the state of the
printer, the print data generating process that

25   requires a longer processing time period can be
performed in order on the printers capable of printing
data, thereby improving the efficiency in the printing

process.

[0118]

Described fourth below is the print control method of decreasing the frequency of a user changing the settings of printers by transmitting all pages adaptive to the settings of the printer prior to disadaptive pages.

[0119]

Figure 17 is a block diagram showing the configuration of the program for executing the print control method according to the embodiment of the present invention. An application program 1701 is used in generating a document configured by characters, graphics, and images. A graphics interface program 1702 provide an interface with drawing processes such as screen display, print processing, etc. A printer control program 1703 is called by the graphics interface program 1702 and converts document data generated by the application program 1701 into a drawing command interpreted by the printers 2001 and 2100.

[0120]

A spooler program 1704 receives the drawing command generated by the printer control program 1703 through the graphics interface program 1702, and passes it to a print data control program 1705. The print data control program 1705 transmits the drawing command

to the printers 2001 and 2100 through a data input/output control program, acquires the status information about the printers 2001 and 2100, and performs the processes described later.

[0121]

An image data storage unit 1706 is a storage area for receiving image data from the print data control program 1705, and temporarily storing the data. A data input/output control program 1707 controls the communications with the printers 2001 and 2100 through the data input/output controllers 1013 and 1015 based on an instruction from the print data control program.

[0122]

Figure 18 is a flowchart of the print data control program in the print control method according to the first embodiment of the present invention. First, the entire pages of a print job are spooled on the hard disk 1004 in page units (S1801). The image data on each of the spooled pages is analyzed, and the printer setting information on each page is extracted (S1802). The image data spooled in step S1801 is data in which the data generated by an application program has already been converted into a printer command that can be interpreted by the printer through a graphics interface program to a printer control program.

[0123]

Figure 19 shows the data format of the printer

status information in the print control method
according to the embodiment of the present invention.
The printer command on each page includes a command
indicating the necessary printer settings for printing
the page.

[0124]

Figure 20 depicts a view illustrating a
correspondence table between each sheet feed method and
a value indicating the method. The portion expressed
by "sheet feed method" in Figure 19 indicates in which
sheet feed method image data is to be printed. The
sheet feed method can be, for example, a manual sheet
feed method, an automatic sheet feeder, a cassette
sheet feed, etc. The respective corresponding values
are shown in Figure 20.

[0125]

Figure 21 depicts a view illustrating the
correspondence table between each paper size and the
value indicating the size. The portion expressed by
the "paper size" shown in Figure 19 indicates the paper
size for printing image data. The paper size can be,
for example, A4, B5, etc., and the corresponding value
is shown in Figure 21.

[0126]

Figure 22 depicts a view illustrating the
correspondence table between each cartridge and the
value indicating each cartridge. The portion indicated

by "cartridge" in Figure 19 refers to the type of print cartridge for printing image data. The print cartridge can be, for example, a black cartridge, a color cartridge, a photo cartridge, a fluorescent cartridge, etc. The value corresponding to each cartridge is shown in Figure 21.

[0127]

In Figure 18, after extracting printer setting information on each page, the spool file name of the page corresponding to the printer setting information on each page extracted in step S1802, and the date and time on which the spool file is stored are saved in the table (S1803).

[0128]

Figure 23 depicts a view illustrating the table indicating the page information in the print control apparatus according to the embodiment of the present invention. When the process in S1803 is completed, the information about the setting state of the printers 2001 and 2100 is requested to the printers 2001 and 2100, thereby acquiring printer status information (step S1804).

[0129]

Figure 24 depicts a view illustrating the data format of the setting information about the printer included in the image data. The portion indicated by the "sheet feed method" in Figure 24 refers to the

sheet feed method used in the printer. The "paper
size" indicates the size of currently set paper sheet
for each of the sheet feed method. The feed method can
be, for example, a manual sheet feed method, an
automatic sheet feeder, a cassette sheet feed, etc.
The respective corresponding values are shown in Figure
20. The paper size can be, for example, A4, B5, etc.,
and the corresponding value is shown in Figure 21. The
portion indicated by "cartridge" refers to the type of
print cartridge loaded into a printer. The print
cartridge can be, for example, a black cartridge, a
color cartridge, a photo cartridge, a fluorescent
cartridge, etc. The value corresponding to each
cartridge is shown in Figure 22.

[0130]

In Figure 18, when the process in step S1804 is
completed, the contents of the table recording the
information on each page in step S1803 are compared
with the status information acquired from the printers
2001 and 2100 in step S1804, and it is determined
whether or not there is a record of data in the table
adaptive to the current state of the printers 2001 and
2100 (step S1805).

[0131]

If there is no page adaptive to the states of the
printers 2001 and 2100, displayed is a dialog box
indicating that a printing process cannot be performed

because the image data to be printed is not adaptive to the printer setting state (step S1806).

[0132]

Figure 25 shows the dialog displayed when image data is not adaptive to the printer setting state. There are two types of function buttons, that is, an "OK" button for selecting a repetitive process from step S1804 again, and a "cancel" button for selecting suspension of printing. If any of the two types of buttons is pressed, control is passed to step S1807. If "OK" is pressed in step S1806, control is passed to step S104. If "cancel" is pressed in step S1806, the data spooled in step S1801 and the contents of the table recorded in step S1803 are cleared, thereby terminating the print data control process

[0133]

If there are pages adaptive to the statuses of the printers 2001 and 2100, the data on the page adaptive to the printer status found in step S1805 is transmitted to the printer (step S1809). The data on the page transmitted in step S1809 is deleted from the spool (step S1810), and the information corresponding to the page transmitted in step S1809 is deleted from the table recorded in step S1803 (step S1811).

[0134]

It is determined with reference to the table recorded in step S1803 whether or not there is data not

yet transmitted (step S1812). If it is determined that there is data not yet transmitted, then the processes from step S1805 are repeated. If it is determined that there is no data not yet transmitted, then the data transmission is completed, and the print data control process terminates.

[0135]

Thus, when data of a plurality of pages is transmitted to a printer, all pages are temporarily spooled, the settings of the printer adaptive to printing each page is compared with the current printer status, the order of print requests is changed, and pages adaptive to the current printer settings are transmitted to the printer in order, thereby reducing the frequency of a user changing printer settings and reducing laborious operations when a job including disadaptive pages and adaptive pages in a mixed manner is processed.

[0136]

Figure 26 is a flowchart of the print data control program in the print control method according to the second embodiment of the present invention. In the above-mentioned first embodiment, immediately after it is determined that image data is disadaptive to printer settings, image data is stored in a hard disk. However, in the second embodiment, image data is not stored in a hard disk immediately after a disadaptivity

determination, but the process is held until another print request is issued, thereby performing a printing process quickly after incompatibility is solved by changing printer settings.

[0137]

In Figure 26, the image data of the page to be printed next is analyzed, and the printer setting information about the page is extracted (step S2601). The image data is obtained by converting the data generated by an application program into a printer command that can be interpreted by a printer through a transfer interface program to a printer control program.

[0138]

A printer command on each page includes a command indicating the printer settings necessary in printing the page in a data format shown in, for example, Figure 19. After extracting the printer setting information on each page, a request for status information is issued to the printers 2001 and 2100, and the status information is acquired (step S2602). The setting state transmitted from the printers 2001 and 2100 indicates the setting state in the data format as shown in, for example, Figure 24.

[0139]

In Figure 26, when the process in step S2602 is completed, the printer setting information on the page to be printed next extracted in step S2601 is compared

with the status information about the current printer acquired in step S2602, and it is determined whether or not they match each other (step S2603). In step S2603, if all of the "sheet feed method", "paper size", and "cartridge" completely match the page to be printed and the printer, then it is determined that the data is adaptive to the printer status.

[0140]

If it is determined in step S2603 that the information is adaptive, the data on the page determined as adaptive to the printer status is transmitted to a printer (step S2604), it is determined whether or not the job has the next page (step S2605), control is passed to step S2601 if it is determined that there is the next page, and the print data control process is terminated if there are no subsequent pages.

[0141]

If it is determined in step S2603 that the information is not adaptive, then it is determined in step S2603 that the page requested to be printed next is not adaptive to the current printer status. Therefore, all data on the pages not yet transmitted to the printer is temporarily spooled in the hard disk 1004 (step S2606). In the following, steps 1802 to S1812 are the same as those shown in Figure 18.

[0142]

Thus, when data on a plurality of pages is

transmitted to a printer, all pages are temporarily
spooled, the settings of the printer adaptive to
printing each page are compared with the current
printer status, the order of print requests is changed,
and pages adaptive to the current printer settings are
transmitted in order, thereby reducing the frequency of
a user changing printer settings and reducing laborious
operations when a job including disadaptive pages and
adaptive pages in a mixed manner is processed. In
addition, at the stage before the processes, the pages
adaptive to the printer settings are not spooled, but
transmitted directly to the printer, thereby avoiding
or reducing the degradation of the performance due to
the spooling process when there are no disadaptive
pages in the job or when there are no disadaptive pages
at the early stages in the job.

[0143]

The print control apparatus according to the
present invention can be applied to a system configured
by a plurality of pieces of equipment or to a device
configured by a piece of equipment. In addition, the
present invention can be similarly applied in response
to not only a print request generated in the host
computer 1001 but also a print request from another
computer over the computer network to the printers 2001
and 2100 by using a host computer on a computer network
such as a LAN as the host computer 1001 and a printer

connected to the host computer as the printer 2001 or 2100.

[0144]

In addition, it is obvious that the present invention can be realized by providing the print control apparatus with a storage medium storing a program code of the software for realizing the functions of each of the above-mentioned embodiments, and reading and executing the program code stored in the storage medium by the CPU of the print control apparatus. In this case, the program code itself realizes a novel function of the present invention, and the storage medium storing the program code configures the present invention.

[0145]

A storage medium for providing a program code can be, for example, a floppy (registered trademark) disk, a hard disk, a magneto optical disk, an optical disk, CD-ROM, CD-R, a magnetic tape, a non-volatile memory card , ROM, etc.

[0146]

[Advantage of the Invention]

As described above, according to the present invention, a change in setting state is detected while checking the setting state of a printer connected to the print control apparatus, the printer setting state is compared with the setting of each print job

requested for transmission to the printer, a print job

matching in settings is transmission-enabled, and a

print job not matching in settings is transmission-held,

thereby avoiding erroneously transmitting a print job

5   not matching the printer settings to the printer.

[0147]

    In addition, when there are print jobs not

matching the printer settings, other print jobs can be

protected against being processed with delay due to the

10   non-matching print jobs, thereby serving a user with

various settings and printing convenience.

[0148]

    Furthermore, the status information about another

printer connected to another print control apparatus

15   connected over a communication circuit network can be

acquired to hold the transmission of a print job or

release the holding as with a locally connected

printing device.

[0149]

20   Furthermore, according to the present invention,

when there are a plurality of print jobs for generating

print data, a print job to a printer in a printable

state is processed on a priority basis while checking

the status information about printers connected to the

25   print control apparatus, thereby optimizing the process

order of the time-consuming print data generating

process, and efficiently performing the printing

process.

[0150]

Furthermore, according to the present invention, all pages adaptive to the printer setting state are transmitted to the printer prior to disadaptive pages, thereby reducing the frequency of user changing printer settings and reducing the complexity. In addition, as compared with the case in which all image data is spooled, the degradation in performance by the spooling process can be avoided or reduced.

[Brief Description of the Drawings]

[Figure 1]

Figure 1 is a block diagram showing a print system to which the print control apparatus according to an embodiment of the present invention is applied.

[Figure 2]

Figure 2 is a flowchart of the print data transmission control program in the print control method according to the embodiment of the present invention.

[Figure 3]

Figure 3 depicts a view illustrating a table showing the type of print head in the print control apparatus according to the embodiment of the present invention.

[Figure 4]

Figure 4 depicts a view illustrating a table

showing the paper information in the print control apparatus according to the embodiment of the present invention.

[Figure 5]

Figure 5 depicts a view illustrating a table showing the lever information in the print control apparatus according to the embodiment of the present invention.

[Figure 6]

Figure 6 shows the display job management information for management of a print job by the print data transmission control program.

[Figure 7]

Figure 7 shows the printer status information in the print control method according to the embodiment of the present invention.

[Figure 8]

Figure 8 shows the printer status management information for management of a print job by the print data transmission control program.

[Figure 9]

Figure 9 shows the print job information relating to the settings of printer in the print control method according to the embodiment of the present invention.

[Figure 10]

Figure 10 shows a list of print jobs displayed by the print data transmission control program.

[Figure 11]

Figure 11 is a flowchart showing the process performed until a printer driver is called by the operating system and intermediate data is generated.

5 [Figure 12]

Figure 12 shows the print job information relating to the print data in the print control method according to the embodiment of the present invention.

[Figure 13]

10 Figure 13 is a flowchart showing the process of the printer driver referring to an intermediate data file and generating print data.

[Figure 14]

Figure 14 is a block diagram of the print system

15 provided with two host computers.

[Figure 15]

Figure 15 is a flowchart showing the print data transmission control program in the print system provided with two host computers.

20 [Figure 16]

Figure 16 is a flowchart showing the process of a printer driver generating print data with reference to an intermediate data file in a print system provided with two host computers.

25 [Figure 17]

Figure 17 is a block diagram showing the configuration of the program for executing the print

control method according to the embodiment of the present invention.

[Figure 18]

Figure 18 is a flowchart showing the print data control program in the print control method according to the first embodiment of the present invention.

[Figure 19]

Figure 19 shows the data format of the printer status information in the print control method according to the embodiment of the present invention.

[Figure 20]

Figure 20 depicts a view illustrating a correspondence table between each sheet feed method and a value indicating the method.

[Figure 21]

Figure 21 depicts a view illustrating the correspondence table between each paper size and the value indicating the size.

[Figure 22]

Figure 22 depicts a view illustrating the correspondence table between each cartridge and the value indicating each cartridge.

[Figure 23]

Figure 23 depicts a view illustrating the table indicating the page information in the print control apparatus according to the embodiment of the present invention.

[Figure 24]

Figure 24 shows the data format of the status information about the printer included in the image data.

[Figure 25]

Figure 25 shows the dialog displayed when image data is not adaptive to the printer setting state.

[Figure 26]

Figure 26 is a flowchart of the print data control program in the print control method according to the second embodiment of the present invention.

[Description of the Symbols]

1001, 1401, 1451   host computer

1100   host computer body

1002, 1402, 2003   CPU

1003, 1403   RAM

1004, 1404   hard disk

1005, 1405   hard disk controller

1006, 1406, 2004   ROM

1007, 1407   keyboard controller

1008, 1416   mouse controller

1009, 1408   CRT controller

1010, 1409   keyboard

1011, 1417   mouse

1012, 1410   CRT

1013, 1015, 1414, 2002   data input/output controller

1014, 1415   common bus

```
1411    sound controller

1412    speaker

1413    network controller

1461, 1462, 2001, 2100    printer

1471    communication circuit network

2005    frame memory

2006    work memory

2007    image recording unit

1701    application program

1702    graphics interface program

1703    printer control program

1704    spooler program

1705    print data control program

1706    image data storage unit

1707    data input/output control program
```

Figure 1

1005 HDD CONTROLLER

1006 PROGRAM ROM, DATA ROM

1007 KEYBOARD CONTROLLER

5   1008 MOUSE CONTROLLER

1009 CRT CONTROLLER

1010 KEYBOARD

1011 MOUSE

1013, 1015, 2002   DATA INPUT/OUTPUT CONTROLLER

10   2004 PROGRAM ROM

2005 FRAME MEMORY

2006 WORK MEMORY

2007 IMAGE RECORDING UNIT

2100 PRINTER

15

Figure 2

#1   PRINT DATA TRANSMISSION CONTROL PROGRAM

S201 INITIALIZING PROCESS

S202 CONFIRM PRESENCE/ABSENCE OF JOB ON STANDBY FOR

20   PRINTING

S203 IS THERE ANY JOB STANDBY FOR PRINTING?

#2   END

S204 IS THERE ANY NEW JOB?

S205 PUT NEW JOB IN TRANSMISSION HELD STATE

25   S206 ACQUIRE STATUS INFORMATION FROM PRINTER

S207 STATUS CHANGED FROM PREVIOUS STATE?

S208 UPDATE STATUS INFORMATION

S209 MATCHING DETERMINATION ON SETTINGS OF ALL RELATED
PRINT JOBS

S210 UPDATE SCREEN DISPLAY DEPENDING ON DETERMINATION
RESULT

5   S211 RELEASE TRANSMISSION HELD STATE OF PRINT JOB
HAVING SETTINGS MATCHING WITH PRINTER STATUS, AND PUT
PRINT JOB HAVING NON-MATCHING SETTINGS IN TRANSMISSION
HELD STATE

10   Figure 3

#1   PRINT HEAD CODE

OR

VALUE OF PRINT HEAD SETTING

#2   CHARACTER STRING INDICATING TYPE OF PRINT HEAD

15   #3   BLACK

#4   COLOR

#5   PHOTO

Figure 4

20   #1   VALUE OF HIGHER TWO BYTES OF PAPER INFORMATION

OR

VALUE OF HIGHER TWO BYTES OF PAPER SETTING

#2   CHARACTER STRING INDICATING PAPER SIZE

#3   VALUE OF LOWER TWO BYTES OF PAPER INFORMATION

25   OR

VALUE OF LOWER TWO BYTES OF PAPER SETTING

#4   CHARACTER STRING INDICATING TYPE OF PAPER

#5   "POSTCARD"

#6   "PLAIN PAPER"

#7   "LUSTROUS PAPER"

#8   "OHP SHEET"

5   #9   "ENVELOPE"

#10   "COATED PAPER"

Figure 5

#1   VALUE OR LEVER INFORMATION

10   OR

VALUE OF LEVER SETTING

#2   CHARACTER STRING INDICATING POSITION OF LEVER

#3   "UPPER"

#4   "INTERMEDIATE"

15   #5   "LOWER"

Figure 6

#1   (A) DATA STRUCTURE FOR EACH JOB OF DISPLAYED JOB

MANAGEMENT INFORMATION

20   #2   JOB ID

#3   POINTER TO NEXT JOB

#4   (B) EXAMPLE OF DISPLAYED JOB MANAGEMENT

INFORMATION

25   Figure 7

#1   FORMAT:

#2   PRINT HEAD CODE:

#3   PAPER INFORMATION

#4   LEVER INFORMATION

#5   (EXAMPLE)

5   Figure 8

#1   (A) DATA STRUCTURE FOR EACH PRINTER OF PRINTER

STATUS MANAGEMENT INFORMATION

#2   PRINTER NAME

#3   PRINT HEAD CODE

10   #4   PAPER INFORMATION

#5   LEVER INFORMATION

#6   POINTER TO STATUS MANAGEMENT INFORMATION ABOUT

NEXT PRINTER

#7   (B) EXAMPLE OF PRINTER STATUS MANAGEMENT

15   INFORMATION

#8   (LOADED WITH PHOTO HEAD)

#9   (A4 COATED SHEET IS SET)

#10   (UPPER LEVER POSITION)

#11   (LOADED WITH BLACK HEAD)

20   #12   (A5 PLAIN PAPER IS SET)

#13   (LOWER LEVER POSITION)

#14   (LOADED WITH COLOR HEAD)

#15   (A4 PLAIN PAPER IS SET)

#16   (LOWER LEVER POSITION)

25

Figure 9

#1   (A) DATA STRUCTURE OF EACH PRINT JOB OF PRINT JOB

INFORMATION

#2   JOB ID

#3   PRINT HEAD SETTING

#4   PAPER INFORMATION

#5   LEVER INFORMATION

#6   POINTER TO NEXT JOB INFORMATION

#7   (B) EXAMPLE OF PRINT JOB INFORMATION

#8   (LOADED WITH PHOTO HEAD)

#9   (A4 COATED SHEET IS SET)

#10 (UPPER LEVER POSITION)

#11 (LOADED WITH BLACK HEAD)

#12 (A5 PLAIN PAPER IS SET)

#13 (LOWER LEVER POSITION)

#14 (LOADED WITH COLOR HEAD)

#15 (A4 PLAIN PAPER IS SET)

#16 (UPPER LEVER POSITION)

Figure 10

#1   LIST OF PRINT JOBS

#2   DOCUMENT NAME

#3   DOCUMENT

#4   PRINTER NAME

#5   DIFFERENCE FROM PRINTER SETTINGS

#6   NO

#7   PRINT HEAD: PRINTER = COLOR/JOB = BLACK

#8   PAPER SIZE: PRINTER = A4/JOB = B4

Figure 11

#1   START INTERMEDIATE DATA GENERATING PROCESS

S1101 GENERATE INTERMEDIATE DATA FILE

S1102 RECEIVE INSTRUCTION OF OPERATING SYSTEM

S1103 END OF PRINT JOB?

S1104 CONVERT RECEIVED DRAW INSTRUCTION INTO
INTERMEDIATE COMMAND

S1105 RECORD INTERMEDIATE COMMAND IN STORAGE DEVICE

S1106 RECORD PRINT JOB INFORMATION IN STORAGE DEVICE

S1107 PRINT DATA GENERATION UNIT ACTIVATED?

S1108 ACTIVATE PRINT DATA GENERATION UNIT

#2   END OF INTERMEDIATE DATA GENERATING PROCESS

Figure 12

#1   (A) DATA STRUCTURE OF EACH PRINT JOB OF PRINT JOB
INFORMATION

#2   JOB ID

#3   PRINTER NAME

#4   JOB NAME

#5   INTERMEDIATE DATA FILE NAME

#6   POINTER TO NEXT JOB INFORMATION

#7   (B) EXAMPLE OF PRINT JOB INFORMATION

Figure 13

#1   START PRINT DATA GENERATING PROCESS

S1301 REFER TO PRINT JOB INFORMATION IN STORAGE DEVICE

S1302 ARE THERE A PLURALITY OF PIECES OF INTERMEDIATE

DATA?

S1303 ALL INTERMEDIATE DATA CORRESPONDING TO SAME

PRINTER?

S1304 ACQUIRE STATUS FROM A PLURALITY OF LOCAL

PRINTERS CORRESPONDING TO INTERMEDIATE DATA

S1305 REFER TO ACQUIRED STATUS, AND DETERMINE PRINTER

FOR GENERATING PRINT DATA ON PRIORITY BASIS

S1306 GENERATE PRINT DATA

S1307 SPOOL OR TRANSMIT PRINT DATA

S1308 IS THERE ONE OR MORE PIECES OF INTERMEDIATE

DATA?

#2   END OF PRINT DATA GENERATING PROCESS

Figure 14

#1   PROGRAM ROM

1405 DATA ROM

1407 KEYBOARD CONTROLLER

1416 MOUSE CONTROLLER

1408 CRT CONTROLLER

1414 DATA INPUT/OUTPUT CONTROLLER

1405 HDD CONTROLLER

1411 SOUND CONTROLLER

1412 SPEAKER

1413 NETWORK CONTROLLER

1409 KEYBOARD

1417 MOUSE

1461 PRINTER

#2   PROGRAM ROM

1406 DATA ROM

1462 PRINTER

5   Figure 15

#1   PRINT DATA TRANSMISSION CONTROL PROGRAM

S201 INITIALIZING PROCESS

S202 CONFIRM PRESENCE/ABSENCE OF JOB ON STANDBY FOR

PRINTING

10   S203 IS THERE ANY JOB STANDBY FOR PRINTING?

#2   END

S204 IS THERE ANY NEW JOB?

S205 PUT NEW JOB IN TRANSMISSION HELD STATE

S1506 ACQUIRE STATUS INFORMATION FROM LOCAL PORT

15   S1507 ACQUIRE STATUS INFORMATION THROUGH NETWORK

S207 STATUS CHANGED FROM PREVIOUS STATE?

S208 UPDATE STATUS INFORMATION

S209 MATCHING DETERMINATION ON SETTINGS OF ALL RELATED

PRINT JOBS

20   S210 UPDATE SCREEN DISPLAY DEPENDING ON DETERMINATION

RESULT

S211 RELEASE TRANSMISSION HELD STATE OF PRINT JOB

HAVING SETTINGS MATCHING PRINTER STATUS, AND PUT PRINT

JOB HAVING NON-MATCHING SETTINGS IN TRANSMISSION HELD

25   STATE

Figure 16

#1   START PRINT DATA GENERATING PROCESS

S1301 REFER TO PRINT JOB INFORMATION IN STORAGE DEVICE

S1302 ARE THERE A PLURALITY OF PIECES OF INTERMEDIATE
DATA IN STORAGE DEVICE?

S1303 ALL INTERMEDIATE DATA CORRESPONDING TO SAME
PRINTER?

S1604 ACQUIRE STATUS FROM A PLURALITY OF LOCAL
PRINTERS CORRESPONDING TO INTERMEDIATE DATA

S1605 REQUEST STATUS OF PRINTER TO ANOTHER PC ON
NETWORK TO WHICH PRINTER CORRESPONDING TO INTERMEDIATE
DATA IS CONNECTED

S1606 ACQUIRE STATUS OF PRINTER FROM ANOTHER PC ON
NETWORK

S1305 REFER TO ACQUIRED STATUS, AND DETERMINE PRINTER
FOR GENERATING PRINT DATA ON PRIORITY BASIS

S1306 GENERATE PRINT DATA

S1307 SPOOL OR TRANSMIT PRINT DATA

S1308 IS THERE ONE OR MORE PIECES OF INTERMEDIATE
DATA?

#2   END OF PRINT DATA GENERATING PROCESS

Figure 17

1701 APPLICATION PROGRAM

1702 GRAPHICS INTERFACE PROGRAM

1703 PRINTER CONTROL PROGRAM

1704 SPOOLER

1705 PRINT DATA CONTROL PROGRAM

1706 IMAGE DATA STORAGE AREA

1707 DATA INPUT/OUTPUT CONTROL PROGRAM

Figure 18

#1   START PRINT DATA CONTROL PROCESS

S1801 SPOOL DATA ON ALL PAGES

S1802 EXTRACT PRINTER SETTING INFORMATION ON EACH PAGE
FROM SPOOLED DATA

S1803 RECORD PRINTER SETTING INFORMATION AND SPOOL
FILE NAME ON EACH PAGE IN TABLE

S1804 ACQUIRE STATUS INFORMATION FROM PRINTER

S1805 IS THERE PAGE MATCHING PRINTER SETTINGS IN
TABLE?

#2   YES

#3   NO

S1806 DISPLAY DIALOG BOX

S1807 OK OR CANCEL

#4   CANCEL

S1808 DELETE DATA IN SPOOL AND TABLE

S1809 TRANSMIT PAGE MATCHING SETTINGS TO PRINTER

S1810 DELETE INFORMATION ON TRANSMITTED PAGE FROM
TABLE

S1811 DELETE DATA ON TRANSMITTED PAGE FROM SPOOL

S1812 IS THERE ANY DATA REMAINING IN SPOOL?

#5   YES

#6   NO

#7   END OF PRINT DATA CONTROL PROCESS

Figure 19

#1　　1 BYTE

#2　　SHEET FEED METHOD

5　#3　　PAPER SIZE

#4　　CARTRIDGE

Figure 20

#1　　SHEET FEED METHOD

10　#2　　VALUE (HEXADECIMAL)

#3　　MANUAL FEED

#4　　AUTOMATIC SHEET FEEDER

#5　　CASSETTE

#6　　OPTIONAL CASSETTE

15　#7　　OTHER SHEET FEED METHOD

Figure 21

#1　　PAPER SIZE

#2　　OTHER THAN PREDETERMINED FORMAT

20　#3　　VALUE (HEXADECIMAL)

Figure 22

#1　　CARTRIDGE

#2　　BLACK

25　#3　　COLOR

#4　　PHOTO

#5　　FLUORESCENT COLOR

#6   OTHER CARTRIDGES

#7   VALUE (HEXADECIMAL)

Figure 23

5   #1   DATE AND TIME

#2   SETTING INFORMATION

#3   SHEET FEED METHOD

#4   PAPER SIZE

#5   CARTRIDGE

10   #6   STORED FILE NAME

Figure 24

#1   (HEXADECIMAL)

#2   1 BYTE

15   #3   SHEET FEED METHOD

#4   PAPER SIZE

#5   CARTRIDGE

Figure 25

20   #1   DATA TO BE PRINTED DOES NOT MATCH SETTINGS OF

PRINTER.

#2   CHANGE SETTINGS OF PRINTER AND PRESS [OK], OR

[CANCEL] TO STOP PRINTING.

#3   CANCEL

25

Figure 26

#1   START PRINT DATA CONTROL PROCESS

S2601 EXTRACT PAGE DATA ON PAGE TO BE PRINTED NEXT

S2602 ACQUIRE STATUS INFORMATION FROM PRINTER

S2603 PAGE ADAPTIVE?

#2 YES

#3 NO

S2604 TRANSMIT PAGE DATA TO PRINTER

S2605 IS THERE NEXT PAGE?

#4 YES

#5 NO

S2606 SPOOL DATA ON ALL PAGES NOT YET TRANSMITTED

S1802 EXTRACT PRINTER SETTING INFORMATION ON EACH PAGE
FROM SPOOLED DATA

S1803 RECORD PRINTER SETTING INFORMATION AND SPOOL
FILE NAME ON EACH PAGE IN TABLE

S1804 ACQUIRE STATUS INFORMATION FROM PRINTER

S1805 IS THERE PAGE MATCHING PRINTER SETTINGS IN
TABLE?

#6 YES

#7 NO

S1806 DISPLAY DIALOG BOX

S1807 OK OR CANCEL

#8 CANCEL

S1808 DELETE DATA IN SPOOL AND TABLE

S1809 TRANSMIT PAGE MATCHING SETTINGS TO PRINTER

S1810 DELETE INFORMATION ON TRANSMITTED PAGE FROM
TABLE

S1811 DELETE DATA ON TRANSMITTED PAGE FROM SPOOL

S1812 IS THERE ANY DATA REMAINING IN SPOOL?

#9   YES

#10 NO

#11 END OF PRINT DATA CONTROL PROCESS

5